Deployment of Privacy-Preserving Machine Learning for Political Polling in the 2024 Presidential Election

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SysteMPC Workshop

July 10, 2025

Overview

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- Learning algorithm follows a train-update loop until convergence
  - Train a logistic regression model on current predictions
  - Update predictions and repeat

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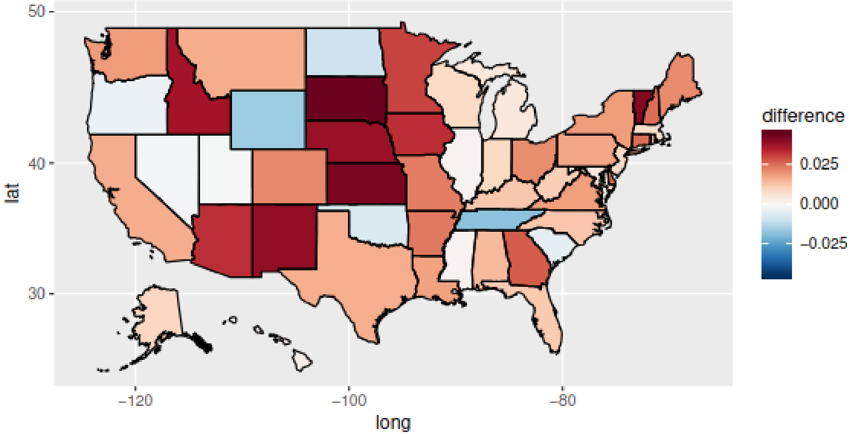
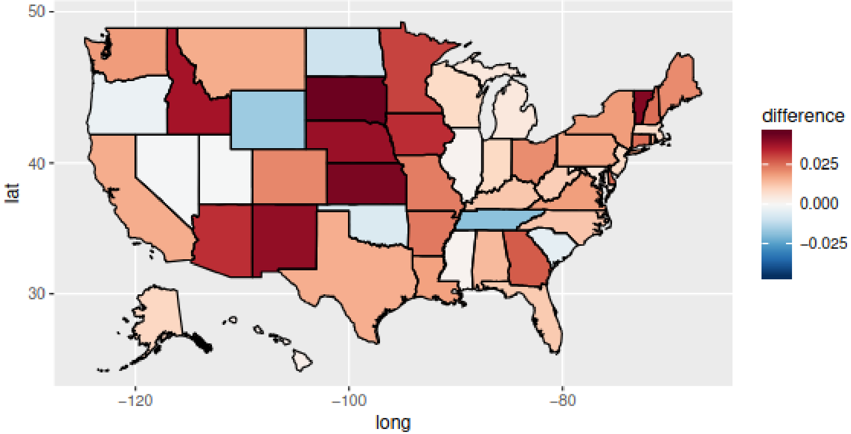


Figure 8: Impact of the 'Comey letter' at the state level.

Motivation

- Web browsing behavior can predict voting results
- Quantifying the 'Comey letter' (Comarela et al.)
  - The event was too close to the election for other polling methods to detect the effect



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Two Approaches to Political Polling

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Traditional Polling

- Slow
- Expensive
- Coarse-grained insights

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Traditional Polling	VS	Web Behavior Analysis
Slow		Immediate
Expensive		Cheap
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What about privacy?

System Design

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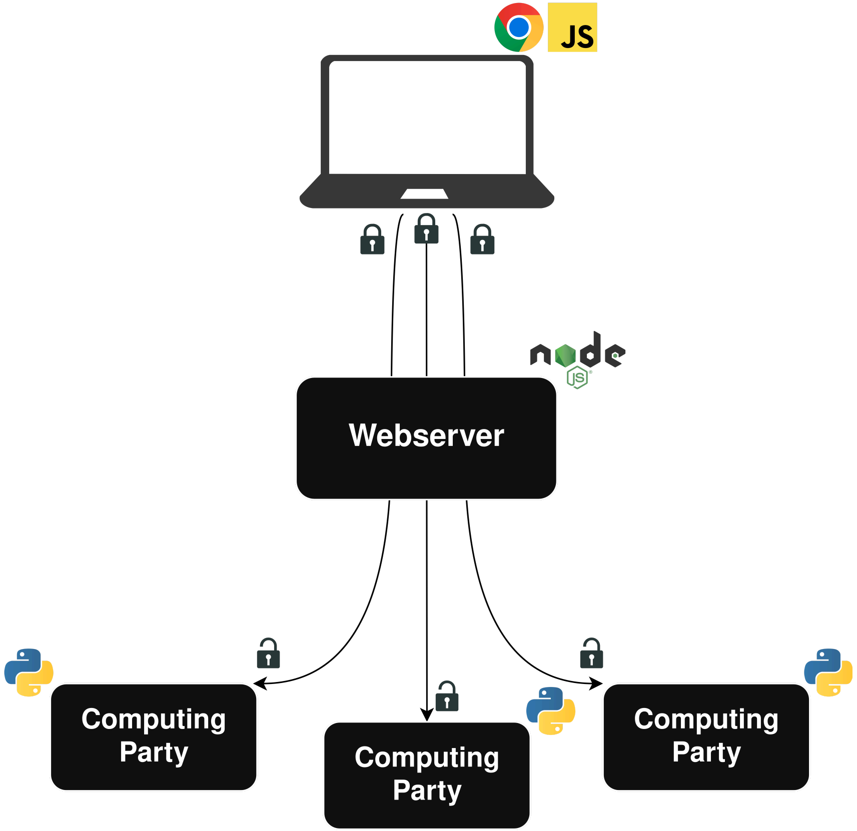

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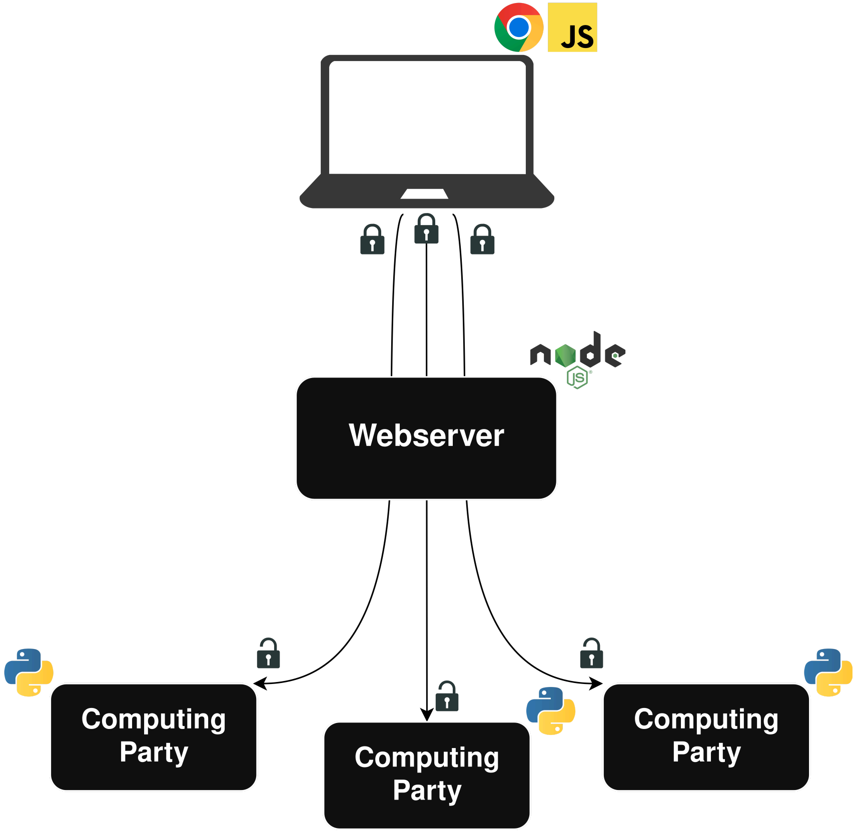

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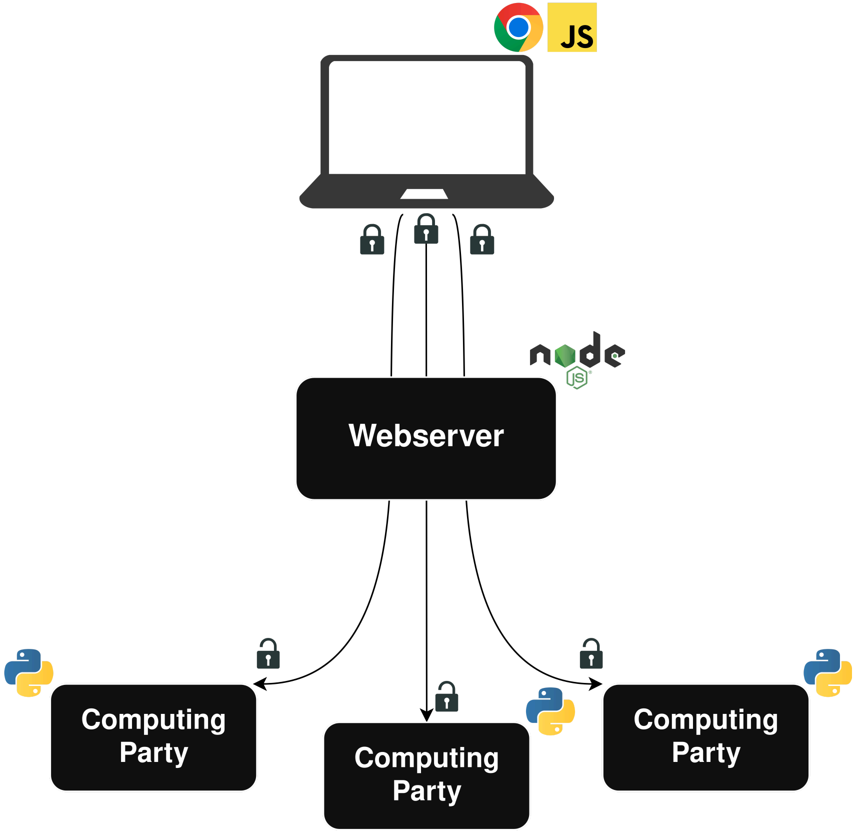

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- Built a Chrome plugin to monitor web behavior
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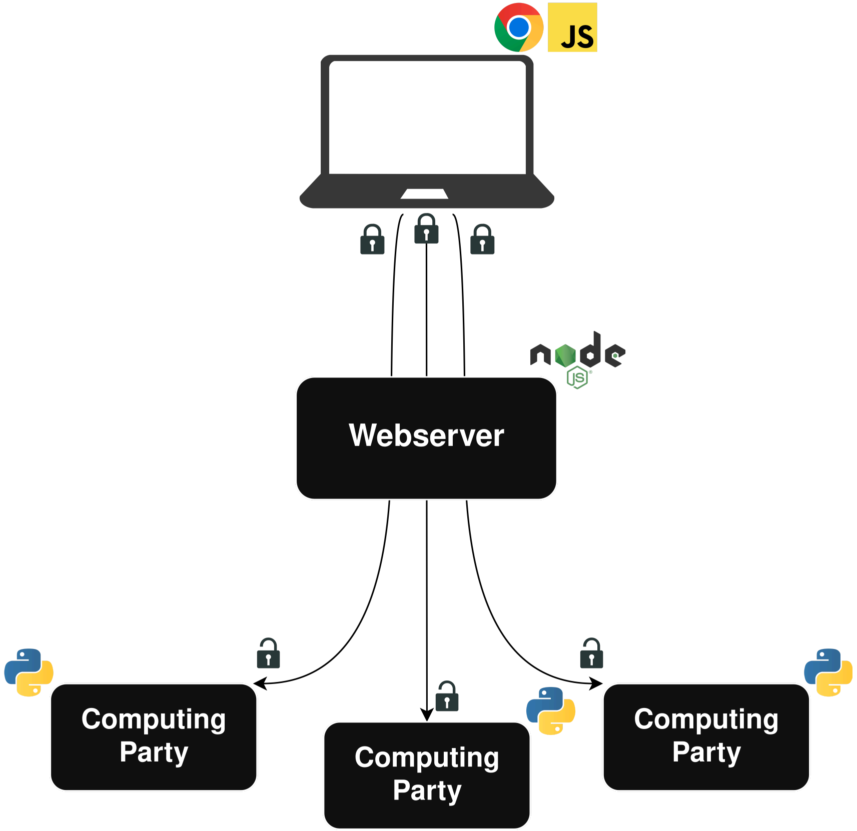

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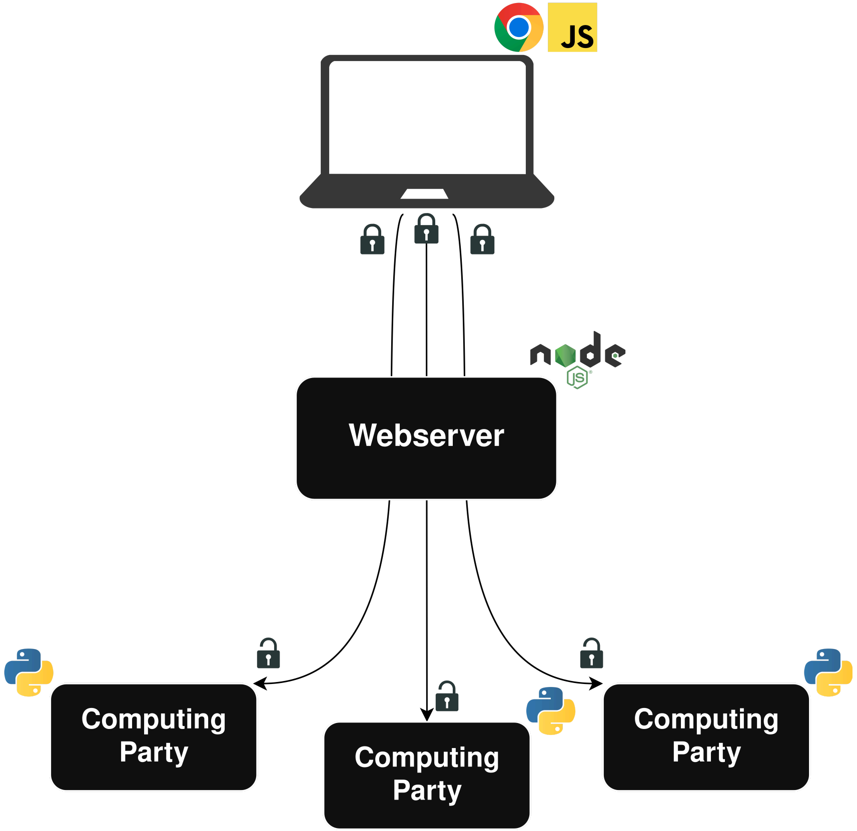

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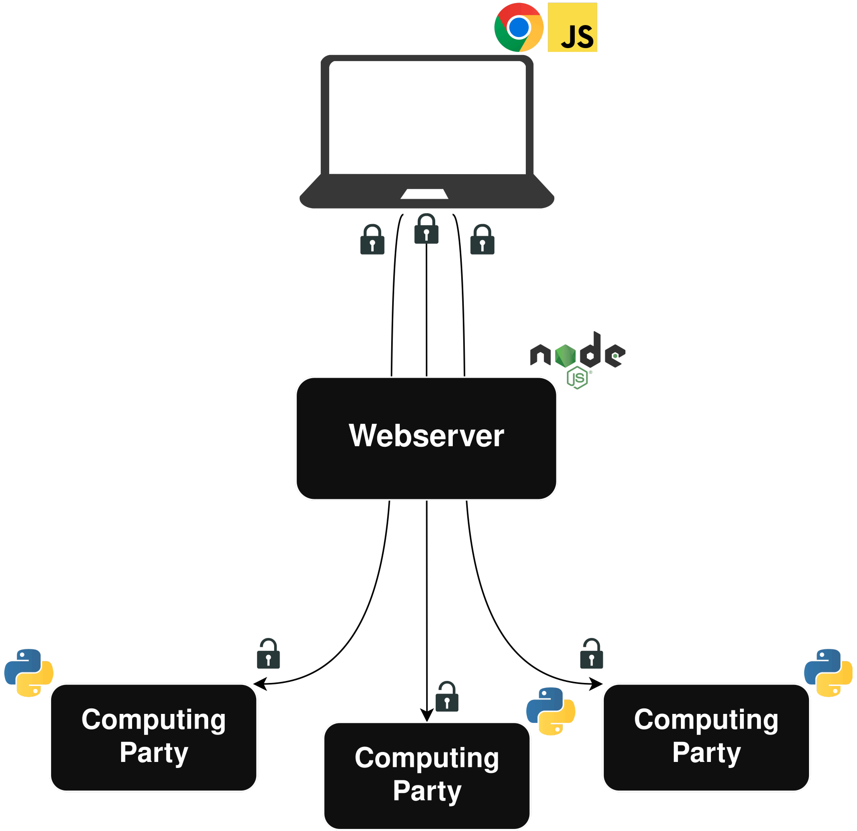

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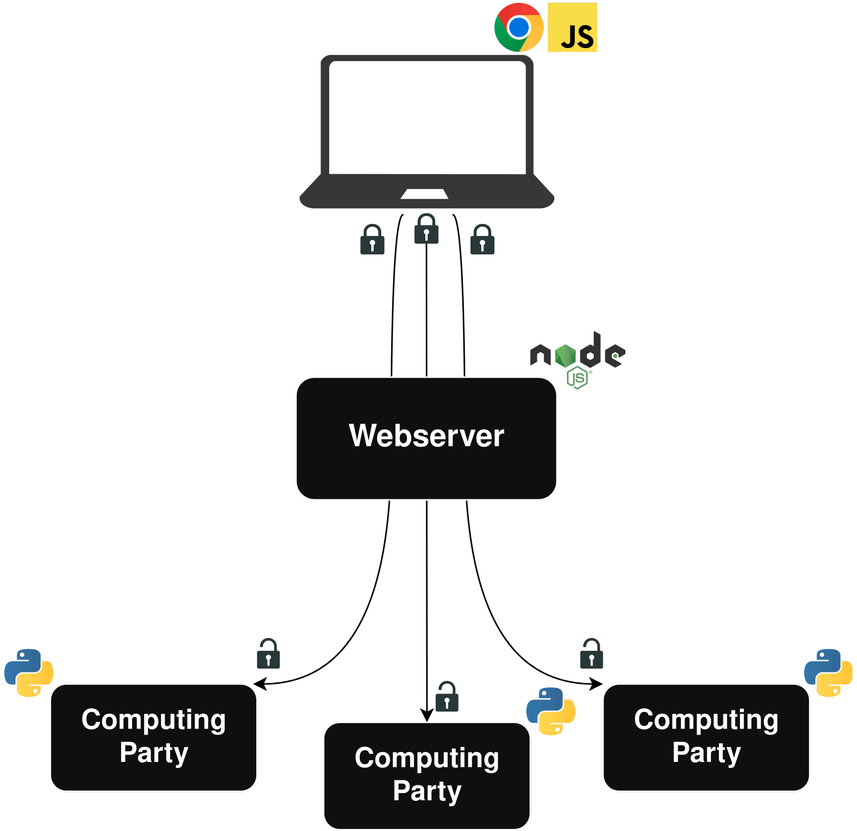

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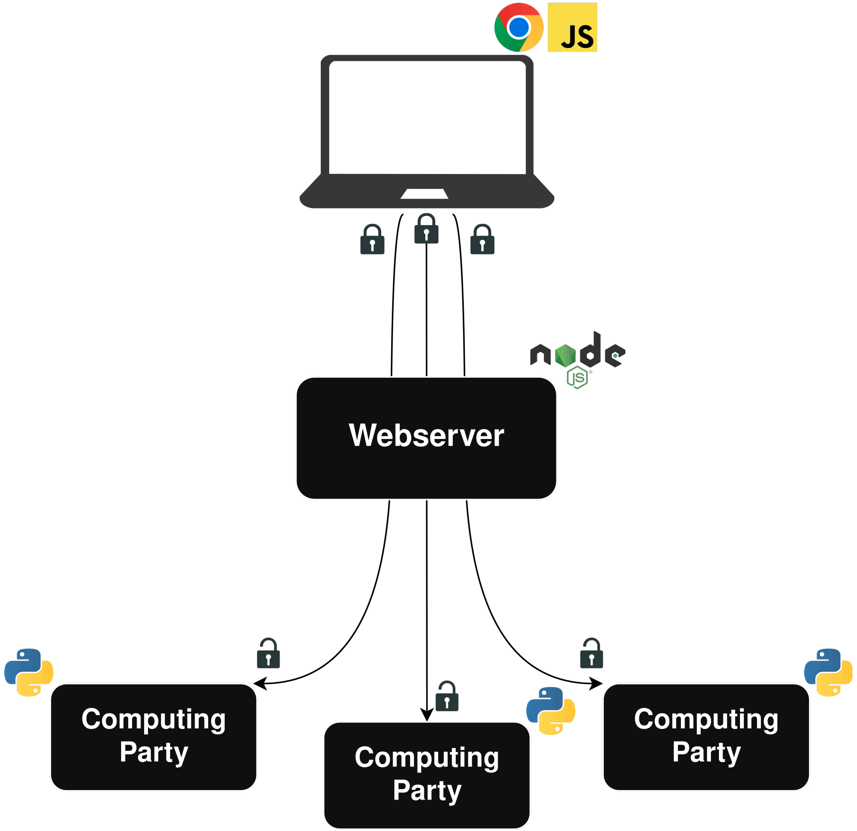

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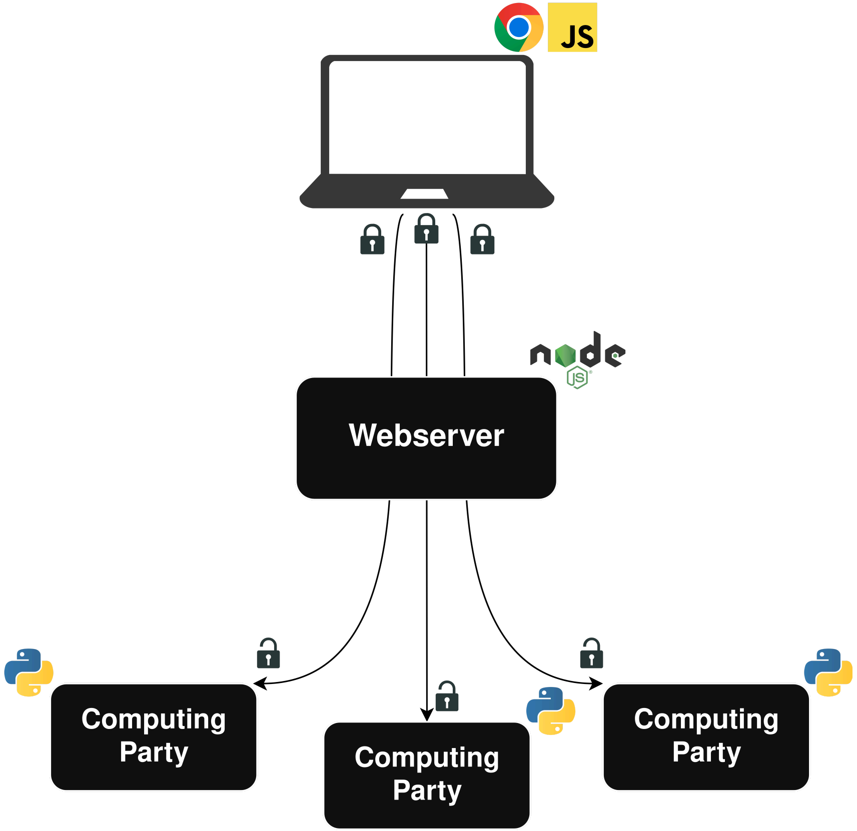

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MPC backend

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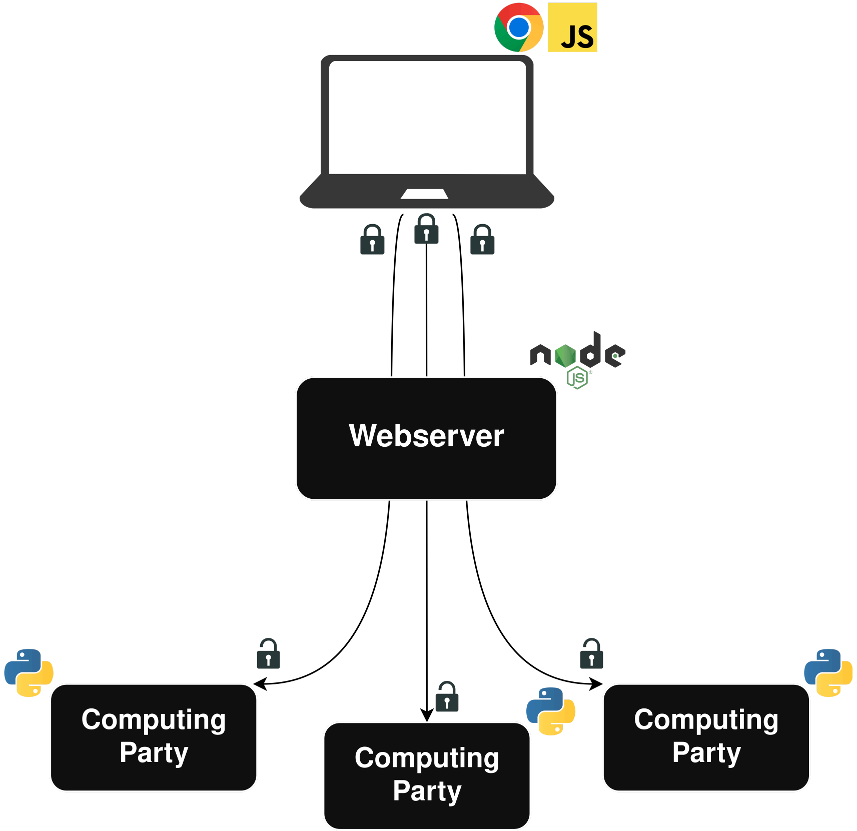
- We use and augment the CrypTen MPC library



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   - How can we balance more extensive tracking with privacy?

2. Strengthen the threat model
   - AWS as a single point of trust
   - Anonymous payments

Thank You!

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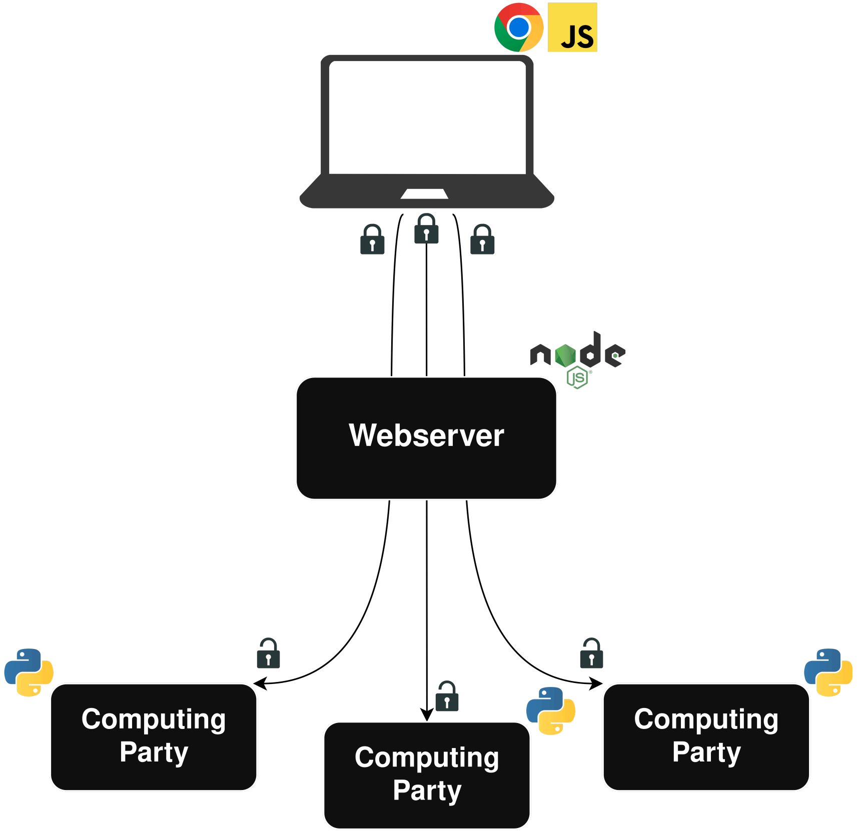
JS
node JS
Webserver
Computing Party
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